

Connected and Automated Vehicle Program Plan

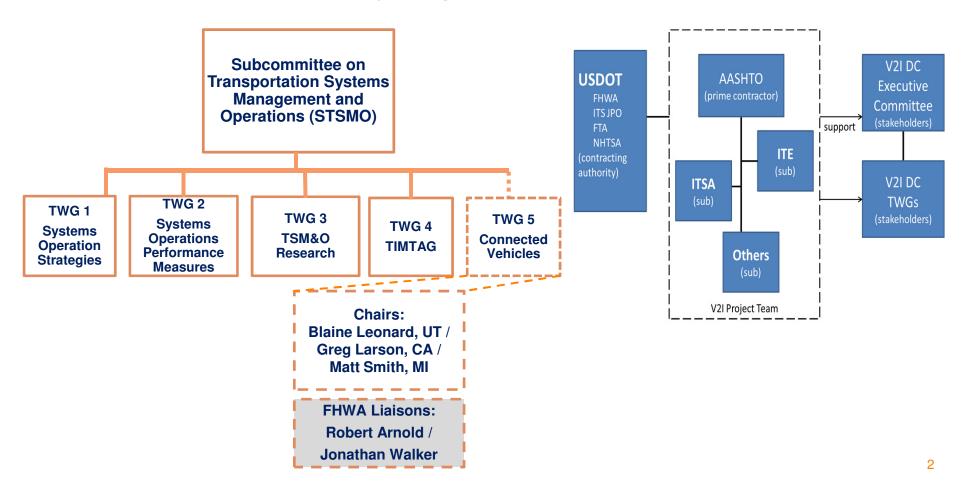
Dean H. Gustafson, PE, PTOE VDOT Statewide Operations Engineer February 10, 2016

Connected Vehicle Program continues to evolve at the National Level

AASHTO Connected Vehicle Working Group

VDOT

Vehicle to Infrastructure Deployment Coalition (V2IDC)



AASHTO Connected Vehicle Technical Working Group focused on State DOT's needs

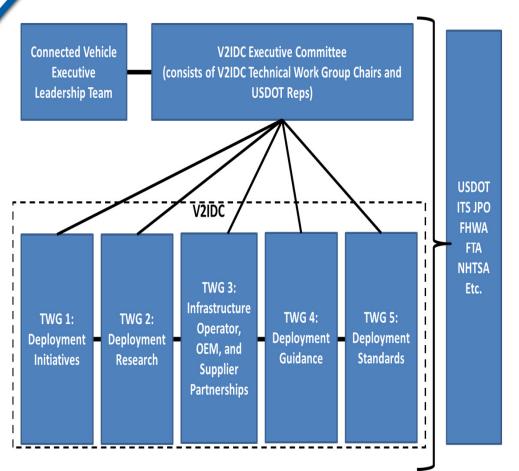
Recently Became Part of STSMO TWG Structure

- Leadership is part of STSMO Executive Committee
- Serves as core technical group for SCOH on CV, AV and other future technical programs
- Interacts with other sub-committees under the Standing Committee On Highways (SCOH)

Role of STSMO TWG5 on Connected Vehicles

- Resource to AASHTO committees on CV and AV issues
- > Address issues and policies of interest to operating agencies
- Chairs will update STSMO members on V2I DC activities
- Continued coordination with the CV PFS

AASHTO will be integrated into multiassociation V2I Deployment Coalition



- STSMO CV TWG Core members (former CV WG Members) will be invited to become V2IDC TWG members
- STSMO CV TWG Chairs will be part of the V2IDC Exec Committee
- TWGs will consist of members from USDOT, State DOTs, Infrastructure Owners, OEMs, and Trade Association members

V2I DC Expected to consist of about 45 people

Connected Vehicle Pooled Fund Study is focused on deployment issues

- Since 2009, VDOT has been the lead state in a Pooled Fund Study to develop and evaluate Connected Vehicle technology and applications
- The program will prepare state and local transportation agencies for the deployment of Connected Vehicle technologies
- The Pooled Fund Study is in Phase II (July 2012 December 2015)
 focusing on developing and field testing connected vehicle applications
 to determine benefits and lessons learned for large scale deployments
- Phase III (July 2015 July 2017) Will continue to focus research and development of connected vehicle applications



















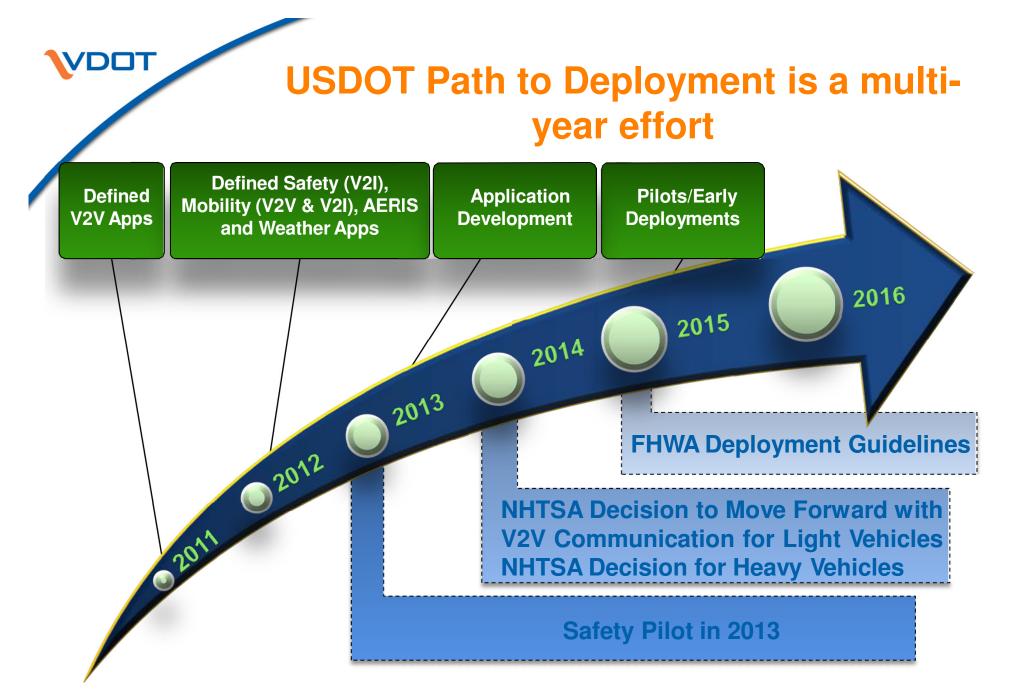














February 10, 2016



- VDOT's FY16 Business Plan calls for the development of a Statewide Connected Vehicle Program Plan
- Business Plan Item 3.2.2 (under Goal 3 Operate):



Develop a statewide connected vehicle program plan to maximize the safety and operational benefits of these emerging technologies.



The capability of vehicles to communicate is here; vehicles can communicate with each other, with technology supporting infrastructure and ancillary assets (like signs and stoplights) and with other types of mobility devices like wheelchairs and bicycles. VDOT leadership will outline the department's <u>vision</u> of the future state of connected vehicle technologies, the <u>impact</u> of that future state on transportation within the commonwealth and define <u>strategies</u> that VDOT will plan to utilize to take advantage of the technology.









- Milestones for the CV Program Plan:
 - ➤ Establish work plan for the development of the Statewide Connected Vehicle Program Plan 10/31/15 (done)
 - Conduct internal and external stakeholder meetings 12/30/15
 - Prepare draft Statewide Connected Vehicle Program Plan 3/31/16
 - ➤ Obtain approvals to execute Statewide Connected Vehicle Program Plan – 6/30/16



- CV Program Plan Expected Outcomes:
 - Clear vision of future state of connected vehicle technologies
 - Impact of that vision on transportation in the Commonwealth
 - Identification of strategies that VDOT will undertake to leverage CV technologies
 - Improved readiness to address changes in CV industry, such as proposed federal rulemaking and advances in private sector CV products and services



Connected Vehicle Technology Provides Connectivity

- Provide connectivity:
 - Among vehicles to enable crash prevention
 - Between vehicles and the infrastructure to enable safety, mobility, and environmental benefits
 - Among vehicles, infrastructure, and wireless devices to provide continuous real- time connectivity to all system users.





Connected Vehicles can Improve Safety, Mobility and the Environment

Safety

"V2V technologies have the potential to address—by providing warnings to drivers— 76% of all potential multi-vehicle crashes involving at least one light-duty vehicle." –GAO

Mobility

➤ Testing in simulation has shown connected vehicle can reduce congestion through better ramp metering, traffic signal control, freeway merge assistance, and dynamic routing

Environment

Connected vehicles can give motorists and transportation managers the real time information they need to make "green" transportation choices and cut down on wasted fuel



Transportation Needs

VDOT Performance Measures & Goals

CV Applications (Priority indicated within parenthesis)

Reduce recurring congestion

I-66 corridor currently experiences average travel speeds of approximately 40 mph during the peak periods

Delay

Vehicle Hours of Delay GOAL: Limit growth to no more than 5% per year













Increase travel reliability

I-66 has a PTI value over 3 during both the morning and evening peak periods

Reliability

GOAL: Reduce PTI by 5% per year











Reduce non-recurring congestion

Incident duration in the Northern Region has averaged 52 minutes over the last year



Incident Duration GOAL: Reduce Incident duration by 5 min in 5 years











Reduce crashes

Facilities within the VCC experienced 2961 crashes (5 fatal and 70 severe injury crashes) in 2014

Safety

GOAL: Reduce fatal & injury crashes by 3% per year (from 2010 baseline)



















Advanced Traveler Information



for Drivers and Workers





Incident Scene Alerts for Drivers



Red Light Violation Warning System

(5)



Queue Warning



V2V - Forward Collision Warning



V2V – Emergency Electronic Brake Light

Parking Availability



Probe Enabled Traffic Monitoring



Integrated Traffic Signal System

(11)

Transit Signal Priority

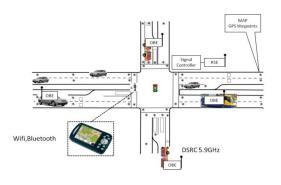


Emergency Vehicle Preemption



VDOT is a Leading Agency in the Connected Vehicle Industry

- VDOT has been active in the Connected Vehicle area for many years
 - Lead state for the Connected Vehicle Pooled Fund Study
 - Provided support for the Connected Vehicle University Transportation Center
 - Developed the VCC for application development and testing
 - Moving towards integration with TOC operations







Virginia Connected Corridors is an Opportunity to Accelerate Deployment

- The VCC is focused on addressing several transportation challenges and providing opportunities to the CV industry
- In addition to CV technology, the VCC includes:

In partnership with

- Support for third-party application development
- Data services, Application Program Interfaces (APIs) and reference applications
- Corridor visualization application
- The VCC will facilitate deployment and integration of connected vehicle data and applications into VDOT Operations





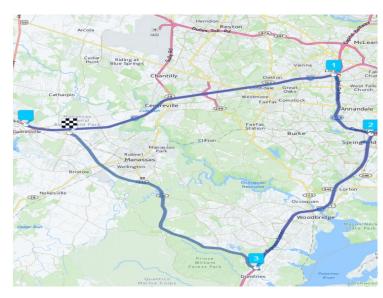


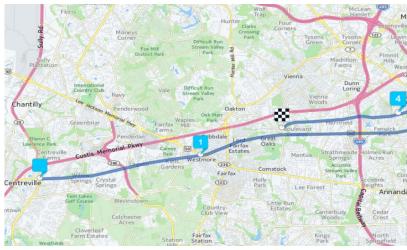




Virginia's Automated Corridor

- Partnership between VDOT, DMV, Here, Transurban and led by VTTI to enable advanced automated vehicle technologies in Virginia
- VDOT has committed to maintaining standards for completeness of marking and retro-reflectivity properties
- Automated Vehicle Demo held Oct 19-20





Automated Vehicles connected to the infrastructure could transform transportation

- How will automated vehicles transform transportation?
- What will transportation look like in the future?
- Where do VDOT and DRPT make investments to improve the transportation system?
- What is the role of government versus private sector?
- What applications will be most popular?





Guide to Planners

- Get educated on the Connected and Automated Vehicle movement.
- Have a dialogue at MPO/PDC Technical Committee meetings, especially localities.
- Standards and interoperability will be critical.
- No clear impacts on transportation modeling.
- No projects to plan yet.
- Vehicle probe data will impact us today, CAV will impact us in the future.
- Help us drive solutions to transportation problems.



THANK YOU!